

SR-CATS: A Short-Range Clear Air Turbulence Sensor, Phase I

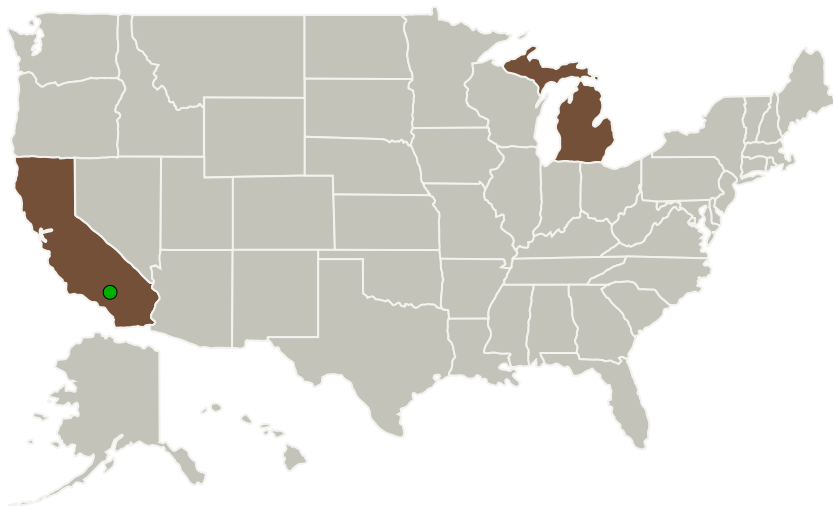
Completed Technology Project (2011 - 2011)



Project Introduction

Clear air turbulence (CAT), often referred to as "air pockets," is attributed to Kelvin-Helmholtz instabilities at altitudes generally above 18,000ft, often in the absence of any visual cues such as clouds, making it difficult to avoid. The vortices produced when atmospheric waves "break" can have diameters of 900-1200ft and tangential velocities of 70-85 ft/sec. CAT is dangerous to aircraft, recently demonstrated by United flight 967 from Washington-Dulles to Los Angeles on July 21, 2010, which encountered severe turbulence and landed in Denver with over 30 injured passengers, 21 requiring a hospital visit. Many other incidents attributed to turbulence have caused injuries or deaths to passengers and crew. Another recently-highlighted hazard is the inadequacy of current airspeed sensors on commercial aircraft. Federal investigators have reported that on at least a dozen recent flights by U.S. jetliners, malfunctioning equipment made it impossible for pilots to know how fast they were flying. Michigan Aerospace Corporation (MAC) proposes the Short-Range Clear Air Turbulence Sensor (SR-CATS) system to detect and measure turbulence within an aircraft length ahead of the aircraft, both as a component of a predictive gust alleviation control system. The integration of the SR-CATS instrument with MAC's full air data solution (airspeed, angle of attack and angle of sideslip), a MAC technology already demonstrated in-flight, will be explored. This proposal will focus on combining these capabilities into a practical solution. MAC's direct-detection UV LIDAR technology uses molecular backscatter and so does not require aerosols, as required by many competing approaches.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Michigan Aerospace Corporation	Lead Organization	Industry	Ann Arbor, Michigan
● Armstrong Flight Research Center(AFRC)	Supporting Organization	NASA Center	Edwards, California

Primary U.S. Work Locations	
California	Michigan

Project Transitions

**February 2011:** Project Start**September 2011:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/137912>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Michigan Aerospace Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

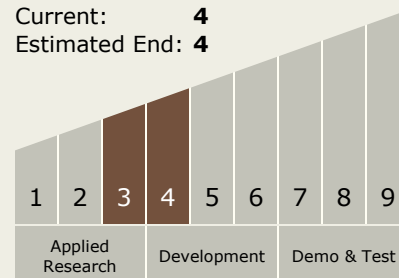
Program Manager:

Carlos Torrez

Principal Investigator:

Dominique Fourquette

Technology Maturity (TRL)

Start: **3**Current: **4**Estimated End: **4**

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Technology Areas

Primary:

- TX16 Air Traffic Management and Range Tracking Systems
 - └ TX16.6 Integrated Modeling, Simulation, and Testing

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System